

WHAT IS CLAIMED IS:

1 1. A method of ablating cardiac tissue, comprising the steps of:
2 providing an ablating device having an ablating element and a suction well, the
3 suction well surrounding the ablating element, the suction well being coupled to a
4 suction line which is coupled to a vacuum source;
5 positioning the ablating device against the patient's epicardium;
6 adhering the ablating device to the epicardium with the suction well; and
7 ablating tissue with the ablating element after the adhering step.

1 2. The method of claim 1, wherein:
2 the ablating step is carried out to form a transmural lesion without penetrating
3 the epicardium.

1 3. The method of claim 1, wherein:
2 the providing step is carried out with the device having means for determining
3 when the suction well is adequately adhered to the epicardium.

1 4. The method of claim 1, wherein:
2 the providing step is carried out with the device having a temperature sensor
3 positioned to measure the temperature of the tissue during the ablating step.

1 5. The method of claim 4, wherein:
2 the providing step is carried out with the temperature sensor being positioned
3 between adjacent ablating elements.

1 6. The method of claim 1, wherein:
2 the providing step is carried out with the suction well having an inner lip and
3 an outer lip, the inner lip forming a closed wall around the ablating element, the
4 device also having a fluid inlet and a fluid outlet for passing fluid into and out of a
5 fluid chamber defined between the inner lip, the ablating element and the tissue.

- 1 7. The method of claim 6, further comprising the step of:
2 delivering a conductive fluid to the fluid inlet.
- 1 8. The method of claim 7, wherein:
2 the delivering step is carried out with the conductive fluid being hypertonic
3 saline.
- 1 9. The method of claim 6, further comprising the step of:
2 delivering the fluid at a temperature of no more than 40°C.
- 1 10. The method of claim 9, wherein:
2 the delivering step is carried out with an average flow rate of fluid across each
3 of a plurality of the ablating elements of at least 0.25 cc/sec.
- 1 11. The method of claim 10, wherein:
2 the delivering step is carried out with the average flow rate of fluid across each
3 of the plurality of ablating elements is at least 0.50 cc/sec.
- 1 12. The method of claim 1, wherein:
2 the providing step is carried out with the ablating element having a width of
3 0.2-0.5 inch and a length of 5-12 inches.
- 1 13. The method of claim 1, wherein:
2 the positioning step is carried out with the ablating element being positioned
3 0.5-3 mm from the tissue.
- 1 14. The method of claim 1, wherein:
2 the providing step is carried out with the device having a plurality of cells,
3 each cell having a suction well and at least one ablating element.
- 1 15. The method of claim 14, wherein:
2 the providing step is carried out with the device having 5-30 cells.

1 16. The method of claim 15, wherein:
2 the providing step is carried out with the device having 10-25 cells.

1 17. The method of claim 14, wherein:
2 the providing step is carried out with the device having means for determining
3 whether each of the cells is adequately adhered to the tissue.

1 18. The method of claim 1, wherein:
2 the providing step is carried out with the device having a locking mechanism;
3 the method further comprising the steps of wrapping the device around the pulmonary
4 veins and forming a closed loop by locking one part of the device to another part of
5 the device with the locking mechanism.

1 19. A device for ablating tissue comprising:
2 a body having a plurality of cells, at least one suction well for adhering the
3 cells to tissue to be ablated; and
4 at least one ablating element contained within the suction well.

1 20. The device of claim 19, wherein:
2 the body has a plurality of suction wells and a suction lumen coupled to the
3 plurality of suction wells.

1 21. The device of claim 19, wherein:
2 the body has 10-25 cells.

1 22. The device of claim 19, further comprising:
2 a fluid inlet positioned to deliver fluid within the suction well; and
3 a fluid outlet which receives fluid from the fluid inlet.

1 23. The device of claim 22, wherein:
2 the ablating element has a long axis and a short axis; and
3 the fluid inlet and fluid outlet are positioned on opposite sides of the ablating
4 element along the short axis.

1 24. The device of claim 13, wherein:
2 the fluid inlet is coupled to a source of conductive fluid.

1 25. The device of claim 9, wherein:
2 the ablating element is an RF electrode.

1 26. The device of claim 18, wherein:
2 the RF electrode has a length of 2-25 mm and a width of 1-6 mm.

1 27. A device for ablating cardiac tissue, comprising:
2 a body;
3 an ablating element coupled to the body;
4 a sensor positioned to measure a parameter at tissue ablated by the ablating
5 element; and
6 a control system coupled to the sensor and the ablating element, the control
7 system receiving parameter measurements from the sensor, the control system being
8 operably coupled to the ablating element and delivering energy to the ablating element
9 in response to the parameter measurements to create a lesion in the tissue.

1 28. The device of claim 27, wherein:
2 the sensor is a temperature sensor; and
3 the control system receives temperature change measurements over a period of
4 time.

1 29. The device of claim 28, wherein:
2 the control system delivers energy to the ablating element until the temperature
3 sensor measures a temperature below a threshold temperature.

1 30. The device of claim 28, wherein:
2 the control system delivers energy to the ablating element for a selected period
3 of time while maintaining the temperature of a near surface of the tissue between 0-
4 80°C.

1 31. The device of claim 28, further comprising:
2 a plurality of ablating elements; and
3 a plurality of temperature sensors, wherein at least two temperature sensors
4 correspond to each ablating element; and
5 the control system receives the temperature change measurements from the at
6 least two temperature sensors for each ablating element.

1 32. The device of claim 31, wherein:
2 each of the plurality of temperature sensors corresponds to one of the ablating
3 elements; and
4 the control system delivers energy to at least one of the ablating elements for
5 which the corresponding temperature sensor measures a lowest temperature.

1 33. The device of claim 27, wherein:
2 the body has a locking mechanism for locking one part of the body to another
3 part of the body to form a closed loop.

1 34. A method of delivering energy to ablate tissue, comprising the steps of:
2 providing a device having an ablating element;
3 positioning the device at a tissue site, the tissue site having a near surface and
4 a far surface;
5 measuring a temperature change at the tissue site over a period of time;
6 analyzing the temperature change to provide a tissue characterization; and
7 ablating the tissue in response to the tissue characterization.

1 35. The method of claim 34, wherein:
2 the analyzing and ablating steps are controlled by a control system;
3 the positioning step is carried out with the tissue site having a near surface and
4 a far surface; and
5 the ablating step being carried out by maintaining the near surface temperature
6 at a temperature of 0-80°C during the ablating step.

1 36. The method of claim 34, wherein:
2 the providing step is carried out with the device having an ablating element;
3 and
4 the method also including the step of changing the temperature of the tissue
5 with the ablating element; and
6 the ablating step is carried out with the ablating element.

1 37. The method of claim 34, wherein:
2 the positioning step is carried out with the device being in contact with the
3 epicardium.

1 38. The method of claim 34, wherein:
2 the ablating step is carried out using the results of the measuring step to
3 approximate when the far surface achieves a target temperature.

1 39. The method of claim 34, wherein:
2 the ablating step is carried out with input of at least one variable from a list of
3 variables consisting of presence of fat, amount of fat, flow rate of blood, tissue
4 thickness and temperature of blood.

1 40. The method of claim 34, wherein:
2 the ablating step is carried out with a plurality of ablating elements, wherein
3 no more than 50% of the ablating elements are activated at one time.

1 41. The method of claim 34, wherein:
2 the providing step is carried out with the device having a plurality of suction
3 wells, at least one of the ablating elements being positioned in each of the suction
4 wells.

1 42. A device for ablating tissue, comprising:
2 an elongate body having an end, the elongate body having at least one ablating
3 element; and

4 a plurality of suction wells in the body, the suction wells being positioned
5 along the length of the body.

1 43. The device of claim 42, wherein:
2 the elongate body has a plurality of ablating elements.

1 44. The device of claim 43, wherein:
2 the suction wells are coupled to a suction lumen.

1 45. The device of claim 47, further comprising:
2 a second suction lumen coupled to another plurality of suction wells.

1 46. The device of claim 46, wherein:
2 the suction lumen is formed by a tube attached to the body.

1 47. The device of claim 42, wherein:
2 the suction well surrounds the ablating element.

1 48. The device of claim 44, wherein:
2 the suction well is formed by an inner lip and an outer lip;
3 the device further comprising a fluid inlet and a fluid outlet, the fluid inlet and outlet
4 being configured to pass a fluid into and out of a space bounded by the inner lip.

1 49. The device of claim 46, wherein:
2 the fluid outlet is coupled to a suction lumen which is also coupled to at least
3 one of the suction wells.

1 50. A method of creating a continuous ablation lesion in heart tissue,
2 comprising the steps of:
3 providing a first ablating section and a second ablating section, the first and
4 second ablating sections each having an end and an ablating element;
5 positioning the first and second ablating sections in contact with the
6 epicardium;

7 wrapping the first and second ablating sections around at least one vessel;
8 interlocking the first and second sections to form a closed loop around the at
9 least one vessel.

1 51. A method of creating a continuous lesion in tissue, comprising the
2 steps of:

3 providing an ablating device having an ablating element;
4 positioning the ablating device in contact with the epicardium;
5 ablating tissue to create a first lesion;
6 moving the ablating device to a location adjacent the first lesion;
7 ablating tissue with the ablating element to create a second lesion which is
8 continuous with the first lesion.

1 52. A method of creating a lesion from an epicardial location, comprising
2 the steps of:

3 providing a first device and a second device slidably coupled to the first
4 device, at least one of the first and second devices having an ablating element;
5 introducing the first and second devices into the pericardial space;
6 ablating tissue to form a first lesion with the ablating element;
7 moving at least one of the first and second devices relative to the other; and
8 forming a second lesion after the moving step.

1 53. A method of ablating cardiac tissue, comprising the steps of:
2 providing an ablating device having an ablating element and a suction well, the
3 suction well being coupled to a suction line which is coupled to a vacuum source, the
4 ablating device also having means for determining when the suction well is adhered to
5 the epicardium;

6 positioning the ablating device against the patient's epicardium;
7 adhering the ablating device to the epicardium with the suction well; and
8 ablating tissue with the ablating element after the adhering step.

1 54. The method of claim 53, wherein:

2 the providing step is carried out with the determining means being a sensor
3 selected from the group of sensors consisting of a flow rate sensor, a pressure sensor
4 and an electric circuit.

1 55. A device for ablating epicardial tissue, comprising:
2 a body;
3 an ablating element mounted to the body;
4 a suction well on the body for adhering the body to the epicardium; and
5 means for determining when the suction well is adhered to the epicardium;

1 56. The method of claim 55, wherein:
2 the determining means is a sensor selected from the group of sensors
3 consisting of a flow rate sensor, a pressure sensor and an electric circuit.

1 57. A method of ablating cardiac tissue, comprising:
2 providing an ablating device having an ablating element, a fluid inlet, and a
3 fluid outlet;
4 positioning the ablating element in contact with a patient's epicardium;
5 flowing fluid through the fluid inlet and fluid outlet to cool tissue laterally
6 spaced from the ablating element; and
7 ablating tissue with the ablating element.

1 58. The method of claim 57, wherein:
2 the providing step is carried out with the ablating device having a vacuum
3 lumen, the fluid outlet being coupled to the fluid outlet; and
4 the method further comprising the step of withdrawing fluid through the fluid
5 outlet with the vacuum lumen.

1 59. The method of claim 57, wherein:
2 the providing step is carried out with the fluid also flowing along a backside of
3 the ablating element.

1 60. The method of claim 57, wherein:
2 the providing step is carried out with the ablating device having at least one
3 suction well; and
4 the method further including the step of adhering the ablating device to the
5 epicardium with the suction well.

1 61. The method of claim 61, wherein:
2 the flowing step is carried out with the fluid cooling an area on the epicardium
3 adjacent to the ablating element.

1 62. A device for ablating tissue, comprising:
2 a body having a plurality of cells, each cell having an ablating element; and
3 a number of hinges positioned between the cells.

1 63. The device of claim 62, wherein:
2 the body is formed of a material and the hinges are formed by integrally
3 formed portions of the material.

1 64. The device of claim 62, wherein:
2 the body has at least 5-30 cells.

1 65. The device of claim 62, wherein:
2 the body has at least one suction well and a suction lumen coupled to the
3 suction well.

1 66. The device of claim 65, wherein:
2 the body has 5-30 suction wells, a number of the suction wells being coupled
3 to the suction lumen.

1 67. The device of claim 66, wherein:
2 the body has two suction lumens extending around the device, the plurality of
3 suction wells being coupled to at least one of the two suction lumens.

1 68. The device of claim 66, wherein:
2 the body has a fluid inlet and a fluid outlet, the fluid inlet and fluid outlet.

1 69. The device of claim 68, wherein:
2 each of the cells has a fluid inlet and a fluid outlet.

1 70. The device of claim 68, wherein:
2 the fluid inlet and fluid outlet are positioned to deliver fluid across a backside
3 of the ablating element.

1 71. The device of claim 68, wherein:
2 the fluid inlet and fluid outlet are positioned to deliver fluid across a frontside
3 of the ablating element and in contact with the tissue being ablated.

1 72. The device of claim 62, further comprising:
2 a fluid conduit which receives a coolant, the fluid conduit directing the fluid to
3 a position on the tissue adjacent to the ablating element.

1 73. The device of claim 72, wherein:
2 the fluid conduit directs the fluid to at least two lateral sides of the ablating element.

1 74. The device of claim 62, wherein:
2 the body is made of an elastomeric material.